The many firsts of STS-114

Testing 1, 2, 3

During the first spacewalk on Flight Day 5, Spacewalkers Soichi Noguchi and Steve Robinson tested new techniques for replacing or repairing damaged tiles on the orbiter. For the repair demonstration, they worked with tiles and Reinforced Carbon-Carbon intentionally damaged on the ground and brought into space in *Discovery*'s cargo bay.

Removing the gap fillers: a spacewalking first

Robinson made a spacewalking first on Wednesday, Aug. 3, when he ventured underneath Space Shuttle *Discovery* to work on its heat shield. Riding the International Space Station's robotic arm, he carefully removed the gap fillers protruding from *Discovery*'s tiles.

Robinson's spacewalk to the underbelly of *Discovery* was the first to repair potential damage on a Space Shuttle orbiter in space.

First podcast from space

One day before landing, Robinson transmitted the first podcast from space.

Here is an excerpt from the transmission:

"Whether you support the space program or not, you're learning from it. You're learning from it the very moment you hear this and think about what we're doing. And I think that learning is what looking over the horizon is all about, and don't forget that learning can be exciting and fun, too, because that's certainly what this mission has been all about."

Discovery, roll over!

On Flight Day 3, Commander Eileen Collins flew the Shuttle through a slow backflip approximately 600 feet from the Space Station, allowing the underside of the Shuttle to face the Space Station. During that time, the Space Station crew snapped digital images using high-magnification lenses to document *Discovery*'s heat shield. This Rendezvous Pitch Maneuver was the first by a Shuttle during an approach for docking to the Space Station.

One of a series of photographs showing the Space Shuttle Discovery *as taken from aboard the International Space Station during rendezvous and docking operations. The Italian-built Raffaello Multi-Purpose Logistics Module is visible in the Shuttle's cargo bay. A docked Soyuz spacecraft, the Station's Canadarm2 and Quest Airlock are also visible.*

NASA ISS01E11238

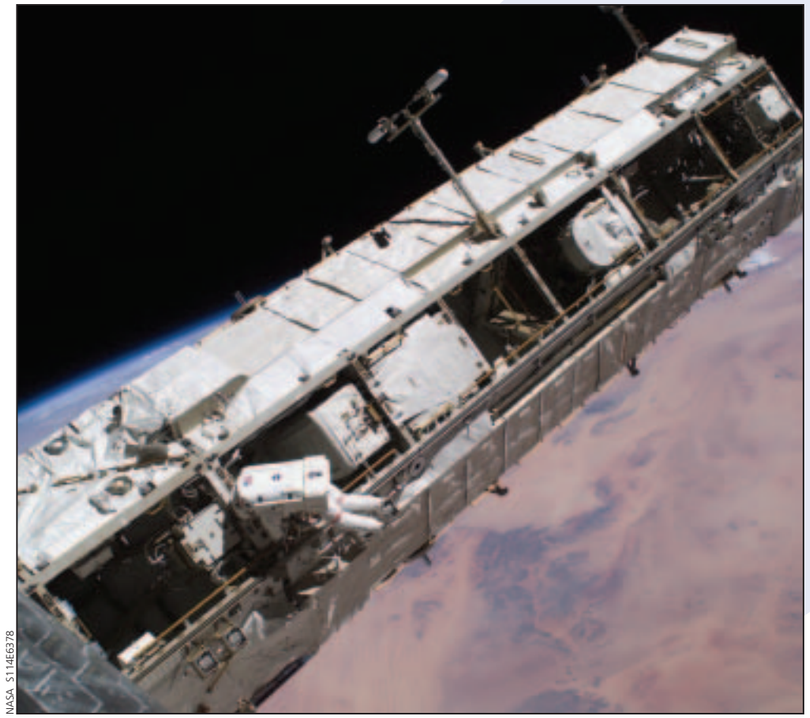
...I think that learning is what looking over the horizon is all about...

All eyes (and lenses) on *Discovery*

- STS-114 was the first Shuttle mission launched within a window designed to allow maximum daylight lighting conditions at Kennedy Space Center.
- *Discovery*'s climb to orbit was extensively documented through a system of new and upgraded ground-based cameras, radar systems and airborne cameras aboard high-altitude aircraft. The imagery captured of *Discovery*'s launch and during the mission helped managers determine the health of *Discovery*'s Thermal Protection System prior to landing. Moments after main engine cutoff, Mission Specialists Noguchi and Andy Thomas used handheld video and digital still cameras to document the external tank after it separated from the Shuttle.
- STS-114 debuted the Orbiter Boom Sensor System (OBSS). The OBSS is a 100-foot-long robotic arm used to inspect critical heat shield areas. The boom is tipped with two types of lasers and a high-resolution television camera.

Sensing a change

Another safety improvement making its first appearance during STS-114 was the Wing Leading Edge Impact Detection System, which will be used for all future Space Shuttle missions. The system includes accelerometers that monitor the orbiter's wings for debris impacts during launch and while in orbit. There are 22 temperature sensors and 66 accelerometers on each wing.



NASA S114E6378

While perched on a Space Station truss, Astronaut Soichi Noguchi, STS-114 mission specialist representing Japan Aerospace Exploration Agency, acts as observer and communication relay station between fellow spacewalker Steve Robinson (out of frame) and Astronaut Andy Thomas aboard Space Shuttle Discovery *during a part of the mission's third session of extravehicular activities. A portion of the thermal protection tiles on* Discovery*'s underside is visible at lower left.*

NASA ISS011E11125

TRIBUTE

THE CREWS OF STS-114 AND EXPEDITION 11

took a few moments, in the early morning hours of Aug. 4, to honor their friends, colleagues and heroes who had lost their lives in the pursuit of space exploration. Members of the combined crew took turns reading passages of a tribute as they orbited more than 200 miles above the Earth. Parts of the statement were repeated in Japanese and in Russian. Below are several excerpts from the tribute.

EXPLORATION: THE FIRE OF THE HUMAN SPIRIT
A TRIBUTE TO FALLEN ASTRONAUTS AND COSMONAUTS

Those who dare to venture into an unexplored land will have revealed to them things which were never known.
Those who venture out upon the sea will have revealed to them things never heard.
But those who venture into the sky upon wings of silence,
Yes, the ethereal adventurers,
Theirs is the revelation of things never dreamed!
Such are the ways of explorers
And the surpassing way of the sky. …

The spirit of exploration is truly part of what it is to be human. Human history has been a continual struggle from darkness toward light, a search for knowledge and deeper understanding, a search for truth. Ever since our distant ancestors ventured forth into the world, there has been an insatiable curiosity to see what lies beyond the next hill, what lies beyond the horizon. That is the fire of the human spirit that we all carry.

Through that spirit and through realizing its ambitions, the human race has come to find its present place in the world. Previous generations went first on foot, then on horseback. Later came the wooden sailing vessels that opened new continents and new lands. Today we have aircraft and spacecraft. We have shrunk the world in a way that early generations of explorers could never have imagined.

Likewise, even if the future is equally unimaginable to us, we can be sure that future generations will look upon our endeavors in space as we look upon those early expeditions across the seas. To those generations, the need to explore space will be as self evident as the need previous generations felt to explore the Earth and the seas. …

To the crew of *Columbia*, as well as the crews of *Challenger*, *Apollo* 1 and *Soyuz* 1 and 11, and to those who have courageously given so much, we now offer our enduring thanks. From you, we will carry the human spirit out into space, and we will continue the explorations you have begun. We will find those new harbors that lie out in the stars and of which you dreamed. …

They shall not grow old, as we that are left grow old:
Age shall not weary them, nor the years condemn.
At the going down of the sun and in the morning
We will remember them.